Remarks

Claims 1-20 are now pending in this application. Claims 1-6 are rejected. Claims 7-20 have been newly added. No new matter has been added. It is respectfully submitted that the pending claims define allowable subject matter.

Applicants acknowledge with appreciation the approval of the proposed drawing correction. Formal drawings were submitted on December 17, 2003. Applicants respectfully request reconsideration and entry of the above amendments filed with a Request for Continued Examination.

Claims 1-6 are rejected under 35 USC § 102(b) as being anticipated by Lampman et al. (U.S. Patent 5,497,089). Applicants respectfully traverse this rejection.

Lampman et al. describes an insertable gradient coil having gradient magnetic field inducing windings adjacent the magnetic isocenter that are of a first, smaller radius dimensioned to receive the head or other selected anatomical portion of the patient. Adjacently said patient end of the coil, the windings extend along a second, larger radius (column 2, lines 27-33). An insertable gradient coil 40 is removably mounted in the center of the bore 12. The insertable coil assembly includes an insertable gradient coil assembly 42 supported by a dielectric former. An insertable RF coil 44 is mounted inside the dielectric former. An RF shield is mounted between the insertable RF and gradient coils (column 3, lines 54-59).

The active gradient coil windings with the insertable gradient coil assembly 42 in the preferred embodiment are confined to a first cylindrical surface region 60 and an open patient end conical surface 62. The cylindrical surface 60 has an isocenter 64 midway, a distance Z_{cp} from either edge of the cylindrical surface. The cylindrical surface has an interior dimension sized to receive the human head and the conical section 62 and a matching surface end conical portion 68 flare from the radius of the cylindrical surface (column 4, lines 13-24). The geometric shape for the gradient coil is symmetric, and hence has an overall torque equal to 0 (column 4, lines 24-25). In order to produce a current distribution which is confined to the cylindrical surface, a cut-off point in the axial direction is chosen at the distance Z_{cp} from the isocenter. With this point as the origin, the remaining end section of the cylindrical surface is tilted by an angle θ relative to the Z-axis to form a conical surface (column 5, lines 15-20). A discrete current pattern for the axial Z-coil which is confined to a 3D surface is a

combination of cylindrical surface up to the point Z_{cp} and a conical surface for the rest of the coil length (column 5, lines 28-31). Discrete wires are positioned in such a way to coincide with contour lines (column 6, lines 52-55).

Thus, with Z_{cp} as the origin, the remaining part of the cylindrical surface is tipped by an angle θ relative to the Z-axis (column 6, lines 58-60). A discrete coil pattern is generated for the transverse x or y-gradient coil which are defined in a 3D surface which is a combination of the cylindrical surface up to the point Z_{cp} and a conical surface for the rest of the coil length (column 6, line 67 to column 7, line 3). Distributed and/or bunched x or y-gradient coils may be used (column 7, lines 65-67).

Claim 1 recites a MRI gradient coil set including a "uniplanar Z-gradient coil positioned substantially perpendicular to said biplanar X-gradient and biplanar Y-gradient coils." Lampman et al. fails to describe or suggest the claimed arrangement of gradient coils as claimed. Lampman et al. merely describes an insertable coil having an axial Z-coil that is confined to a 3D surface which is a combination of a cylindrical surface and a conical surface for different portions of the coil length such that the conical surface is formed by tilting the cylindrical surface. The z-gradient coil windings and x and y-gradient coil windings are mounted such that a portion of the windings are on the first, smaller circumferential portion and a portion of the windings are on the larger patient and service end portions (abstract). For the reasons set forth above, Applicants submit that claim 1 is patentable over Lampman et al.

Claims 2-6 depend from independent claim 1. When the recitations of claims 2-6 are considered in combination with the recitations of claim 1, Applicants submit that dependent claims 2-6 are likewise patentable over Lampman et al. for at least the reasons set forth above.

Newly added claims 7-11 each depend from independent claim 1. When the recitations of claim 7-11 are considered in combination with the recitations of claim 1, Applicants submit that newly added dependent claims 7-11 likewise are patentable over the cited prior art.

Newly added claim 12 recites a gradient coil set for magnetic resonance imaging comprising "a z-gradient coil positioned substantially in parallel with main magnet poles of a magnetic resonance imaging system; an X-gradient coil positioned substantially perpendicular to the main magnetic poles; and a Y-gradient coil configured in a biplanar

arrangement with said X-gradient coil and positioned substantially perpendicular to the main magnet poles, said gradient coils having a Z-axis opening." The references cited fail to describe or suggest a gradient coil set for magnetic resonance imaging as recited in newly added independent claim 12. Accordingly, at least for the reasons set forth above, Applicants respectfully submit that claim 12 is patentable over the cited art.

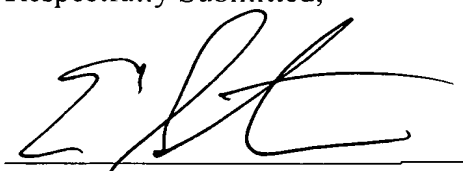
Newly added claims 13-18 each depend from newly added independent claim 12, which is submitted to be in condition for allowance and patentable over the cited art. For at least the reasons set forth above, Applicants respectfully submit that when the recitations of claims 13-18 are considered in combination with the recitations of claim 12, these claims are likewise patentable over the cited references.

Newly added claim 19 recites a method for magnetic resonance imaging comprising "configuring a Z-gradient coil substantially perpendicular to a pair of biplanar X-gradient and Y-gradient coils, said coils arranged having a Z-axis opening." The references cited fail to describe or suggest a method of magnetic resonance imaging as recited in independent claim 19. Accordingly, Applicants respectfully submit that for at least the reasons set forth above claim 19 is patentable over the cited art.

Newly added claim 20 depends from newly added independent claim 19, which is submitted to be in condition for allowance and patentable over the cited art. For at least the reasons set forth above, Applicants respectfully submit that when the recitations of claim 20 are considered in combination with the recitations of claim 19, this claim is likewise patentable over the cited references.

In view of the foregoing comments, it is respectfully submitted that the prior art fails to teach or suggest the claimed invention and all of the pending claims in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited. Should anything remain in order to place the present application in condition for allowance, the Examiner is kindly invited to contact the undersigned at the telephone number listed below.

Respectfully Submitted,



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